2009

Engaging Students in Conservation: Protecting the Endangered Snow Leopard

Facing the Future, Western Washington University

Engaging Students in Conservation:

Protecting the Endangered Snow Leopard

An Interdisciplinary Curriculum Recommended for Grades 5–8

1–2 Week Curriculum Unit

Facing THE Future™

Snow Leopard Trust

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Facing THE Future™

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Engaging Students in Conservation:
Protecting the Endangered Snow Leopard

The ***Snow Leopard Trust*** is the world's leading authority on the study and protection of the endangered snow leopard. The Trust protects the endangered snow leopard from extinction, supports rural families, and safeguards the mountain environment of Asia through long-term partnerships, community-based conservation, and rigorous science. We use a combination of approaches that focus on partnering with communities in snow leopard habitat. As we build community partnerships we use science and research to determine key snow leopard habitat, assess wildlife-human conflict levels, and identify potential resources for conservation programs. For more information, visit www.snowleopard.org.

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Facing the Future is a nonprofit organization dedicated to educating and motivating today's students to be responsible stewards of tomorrow's world. We develop and deliver standards-based hands-on lessons, student textbooks, curriculum units, and professional development opportunities for educators that promote critical thinking on global issues, sustainability, and positive solutions. *Facing the Future* curriculum is in use in all 50 U.S. states and over 85 countries by teachers and students in grades K-12, in undergraduate and graduate classes, and across multiple subject areas. For more information, visit www.facingthefuture.org.

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About This Curriculum:
Students Taking Action for Snow Leopard Conservation

The snow leopard is a majestic and elusive endangered species found in the remote mountains of Central Asia. Uniquely adapted to one of the harshest environments in the world, these cats survive at extreme altitudes and are a keystone species. Their presence influences and regulates the balance of plants and animals within their ecosystem.

Although they have roamed the mountains for centuries, like other top predators they face threats due to the overlap in landscape and resource use between humans and snow leopards. Threats to snow leopard survival include illegal hunting by poachers and loss of habitat and wild prey as people and their livestock move into new areas. Human-wildlife conflicts such as these are not unique to snow leopards; they occur all around the world. Solutions for wildlife conservation are complex because they are often linked to the livelihood and needs of humans who share a habitat with wildlife.

This unit of study encourages students to explore a variety of topics and activities related to snow leopard conservation. By learning about snow leopards and the threats to their survival, students will understand the pressures facing wildlife around the world and the interconnections among those pressures. They will engage in activities that allow them to consider the many different stakeholders and points of view involved in wildlife conservation. Students will also engage in real and meaningful efforts to protect these important animals, envisioning and designing solutions that balance the needs of people and natural ecosystems. Additionally, these lessons encourage students to develop 21st century skills such as critical thinking, collaborating with peers, and employing a global perspective.

JOHN STAHL

The series of five lessons in this curriculum unit is presented in a suggested sequence. The series begins with an introduction to snow leopards and their unique ecosystem, then moves into an exploration of the human-wildlife conflicts that exist where people and snow leopards overlap, and engages students in the creative process of developing conservation solutions for real-life wildlife conflicts.

The unit culminates with a service learning activity that provides students with the opportunity to directly contribute to the protection of these cats. In this final activity, students engage in a conservation project called Snow Leopard Enterprises. Snow Leopard Enterprises, operating in Mongolia and Kyrgyzstan, is a conservation project of the Snow Leopard Trust.

Though the lessons are designed as a comprehensive unit, each lesson can also stand alone.

Grade Level: 5-8

Unit Length: 1-2 weeks

Key Concepts

- adaptation
- biodiversity
- civic participation
- community-based conservation
- ecosystem
- environment
- food web
- government
- human-wildlife conflict
- negotiation
- point of view
- service learning
- sustainable solution

Student Objectives (Abbreviated)

- Discover how wild cats, in particular snow leopards, are adapted to ecosystem conditions
- Understand how species are connected in a food web
- Evaluate how to meet the needs of humans and wildlife simultaneously
- Devise sustainable solutions for enhancing human and ecological communities where snow leopards live
- Participate in Snow Leopard Enterprises, a conservation project of Snow Leopard Trust
- Determine how to support an important conservation, community, or school project

National Standards Addressed

National Science Education Standards

C. Life Science

F. Science in Personal and Social Perspectives

National Council for the Social Studies

III. People, Places, and Environments

IV. Global Connections

V. Individuals, Groups, and Institutions

VI. Power, Authority, and Governance

VII. Science, Technology, and Society

IX. Global Connections

X. Civic Ideals and Practices

North American Association for Environmental Education

1 Questioning, Analysis, and Interpretation Skills

2.2 The Living Environment

2.3 Humans and Their Societies

2.4 Environment and Society

3.1 Skills for Analyzing and Investigating Environmental Issues

3.2 Decision-Making and Citizenship Skills

4 Personal and Civic Responsibility

Lesson 1

The Cat's out of the Bag!

This lesson begins with a word splash activity in which students explore environmental features of the snow leopard's mountain habitat. In a hands-on group activity, students assemble puzzles in order to construct four distinct cat species. Students consider how these cats are uniquely adapted to their ecosystems. The activity concludes with a focus on snow leopards in particular, including photos and videos of the cat in its natural habitat, and an expansion of the word splash to include snow leopard adaptations.

STEVE TRACY

STEVE TRACY

Inquiry/Critical Thinking Questions

- How do an animal's physical characteristics and behaviors aid its survival?
- How is the snow leopard uniquely adapted to its habitat?

Objectives

Students will:

- Link cat adaptations to environmental conditions
- Compare morphology and habitats of four cats—snow leopard *(Uncia uncia)*, Canadian lynx *(Lynx canadensis)*, jaguar *(Panthera onca)*, and cheetah *(Acinonyx jubatus)*
- Become familiar with unique characteristics of snow leopards—habitat, adaptive features and behaviors

Time Required

1 class period

Key Concepts

- adaptation
- environment

Subject Areas

- science
- English/language arts
- geography

National Standards Alignment

NSES

C. Life Science (structure and function in living systems; diversity and adaptations of organisms)

F. Science in Personal and Social Perspectives (populations, resources, and environments)

NCSS

III. People, Places, and Environments

IV. Global Connections

NAAEE

2.2 The Living Environment (organisms, populations, and communities)

2.4 Environment and Society (environmental issues)

Vocabulary

adaptation—a physical characteristic or behavior that helps an organism to survive in specific environmental conditions

ecosystem—all the living and nonliving components found within a given area that function together as a unit; an ecosystem includes an *environment* and the organisms living within it

environment—physical surroundings; in science, environment often refers to the natural world

habitat—the natural environment where an organism lives

STEVE TRACY

Materials/Preparation

9 pieces of paper, each with one of the following phrases written in large letters with a marker: *high altitude, thin air, very cold, long winter, deep snow, few trees, rocks, steep slopes, cliffs*

Post the pieces of paper on a wall or board where all students can read them

Handout: *Four Ecosystems*

Clear plastic bag that closes securely (e.g. Ziploc bag), 1 for each group of 4 students

Cat Characteristic Cards, photocopied, cut, and placed in a Ziploc bag; 1 complete set of 4 cats per group of 4 students [use dotted lines as cutting guides]

Handout: *Big Cat Facts,* 1 per group

Handout: *Graphic Organizer,* 1 per group

Internet access for snow leopard videos and photos (could be downloaded and saved on a computer ahead of time)

Blank index cards, 1 for each student or pair

Activity

Introduction: Word Splash

(5-10 minutes)

1. This lesson begins with a *word splash.* A word splash is an assortment of words related to a particular topic that allows students to brainstorm around that topic.
2. Ask students to silently read the words on the nine pieces of paper that you've posted (see Materials/Preparation section). Tell them that these pertain to what you will study in class today. Ask students to brainstorm about possible things they will study today based on the word splash. Explain that even if they are not familiar with some of the words, they can still make predictions based on words they do know.
3. Read the phrases out loud one at a time. Ask students to share their ideas about how these phrases might be related.
4. Have students brainstorm with a partner five items they would need to survive in this environment. *(Examples might include a warm coat and snowshoes.)*
5. Ask volunteers to share their brainstorm items.
6. Let the class know that today you will study how animals are adapted to survive in particular environments.

TERI AKIN

Core Activity: Cat Characteristics
(30-40 minutes)

1. Tell the class that they are about to investigate the physical characteristics of different cat species that help the cats survive in their **habitats**.
2. Divide the class into groups of four. Distribute a bag of prepared Cat Characteristic Cards to each group.
3. Provide each group with one copy of the handout *Four Ecosystems*. You may want to review the definition of **ecosystem** with students.
4. Give students a couple of minutes to construct four distinct cats using the cards in their bag.
5. Once cats are constructed, ask student groups to make educated guesses about which cat lives in each of the four ecosystems. Encourage them to think about which characteristics make a cat more likely to live in one ecosystem versus another.
6. Pass out one *Big Cat Facts* sheet and one graphic organizer to each group. The fact sheet will allow them to determine whether they have correctly constructed and guessed the identity of the cats. Ask students within each group to take turns reading aloud about each of the four cat species.
   - **(Optional)** You may want to have students do their own research, rather than using the handout. The *Big Cat Facts* references may be used as starting points for research.
7. Allow student groups 15-20 minutes to read the *Big Cat Facts* and complete the graphic organizer. You may want students to read the facts and highlight information or take notes prior to writing on the graphic organizer.
8. Tell them that this exercise is not just about wild cats in general but is an introduction to a study of snow leopards in particular. Snow leopards only live in the mountains of Central Asia and in zoos.
9. Ask student groups to share the features of snow leopards, from the Facts sheet or from prior knowledge, that they consider unique. What is most unusual about snow leopards?
10. Explain that the snow leopard is one of the least known cat species in the world. This is due to a small estimated population, its remote environment, its secretive behaviors, and a huge range (across twelve countries in Asia).
11. Show one or more of the following short videos (each is 2-3 minutes) of snow leopards and their habitat from Discovery Channel's *Planet Earth:*
    - http://dsc.discovery.com/videos/planet-earth mountains-snow-leopard-hunt.html

CHARLES DYE

- http://dsc.discovery.com/videos/planet-earth-elusive-snow-leopard.html
- http://dsc.discovery.com/videos/planet-earth-mountains-on-the-edge.html

12. Ask students how the images of snow leopards compared to their impressions of snow leopards from the puzzle activity and the reading.
13. Either as a group discussion or a journal writing activity, have students answer the following discussion questions.

Discussion

1. How is each cat adapted for its particular environment?
2. Describe the snow leopard's environment.
3. What kinds of things (for example, specific items of clothing or types of shelter) would you need to survive in that type of environment?
4. How is the snow leopard adapted to live in the central mountain region of Asia?
5. Do you think cheetahs, lynx, and jaguars could survive in the central mountains of Asia? What adaptive features do they have? What adaptations do they lack?
6. What species live near you? What adaptations do they have? Would it be easy or difficult for those species to live where snow leopards live?

Wrap Up: Making a Bigger Splash
(5 minutes)

1. Distribute blank index cards to individual students or pairs. Have each student or pair write one snow leopard adaptation (physical characteristic or behavior) on an index card.
2. Post the cards on the wall to expand your word splash.
3. **(Optional)** Keep the cards up for the remainder of your snow leopard unit of study. Continue to expand your word splash using the directions provided in subsequent lessons.

Extension Activity

Create a board game that would teach younger children about the special characteristics and behaviors of snow leopards. The object of the board game is for students to learn about characteristics unique to snow leopards and understand how specific adaptations help them to survive. Each player could roll a die and then draw an adaptation card *(ex: What is the purpose of a snow leopard's long furry tail?)*. If he or she correctly guesses the way in which a particular characteristic of snow leopards allows them to thrive in their environment *(ex: Snow leopards wrap their tails around their faces to stay warm.)*, the player advances on the board according to the number on the die.

COURTESY OF SNOW LEOPARD TRUST

Additional Resources

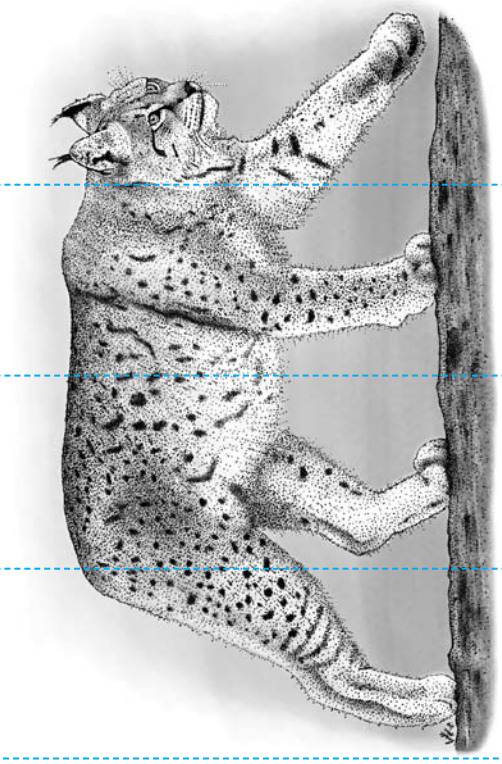
Photos and Videos

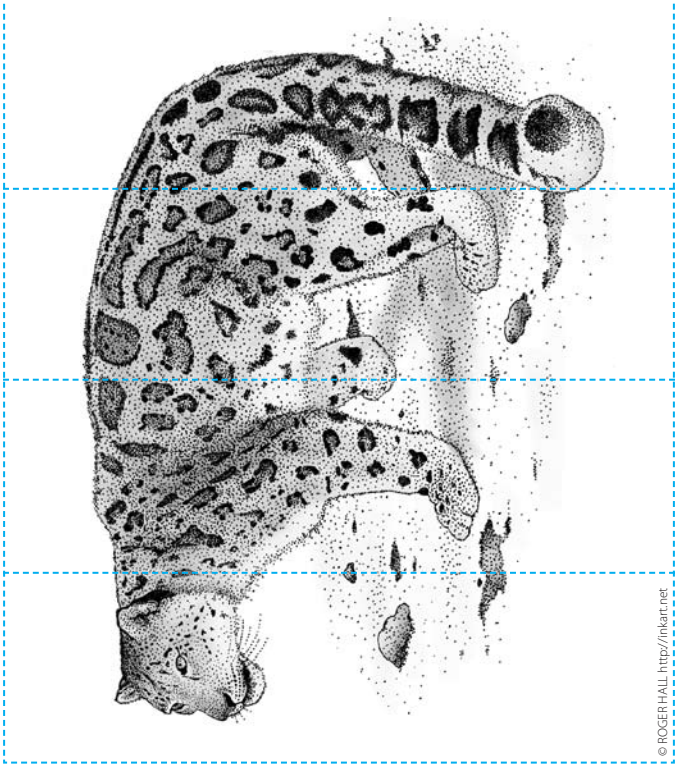
- www.snowleopard.org—Snow Leopard Trust has many photographs and videos of snow leopards available on their website. Their photo gallery also includes images of landscapes, people, and cultures of Central Asia.

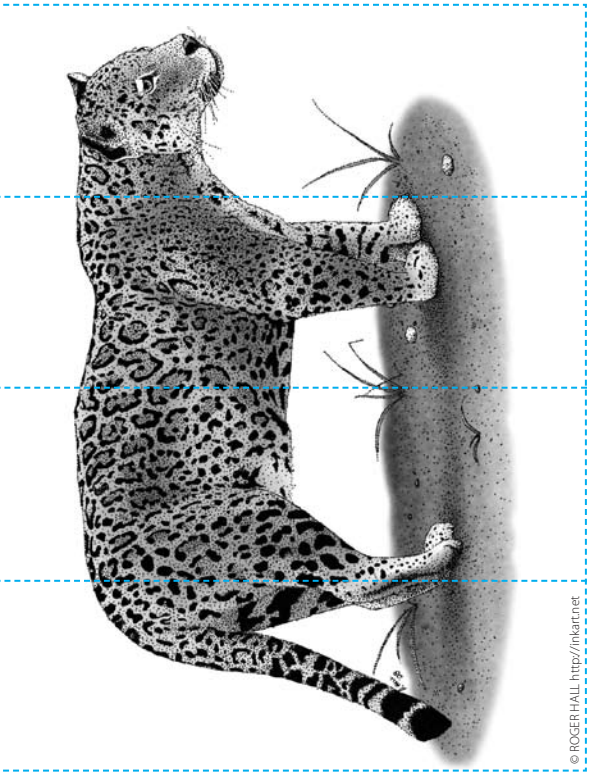
Websites

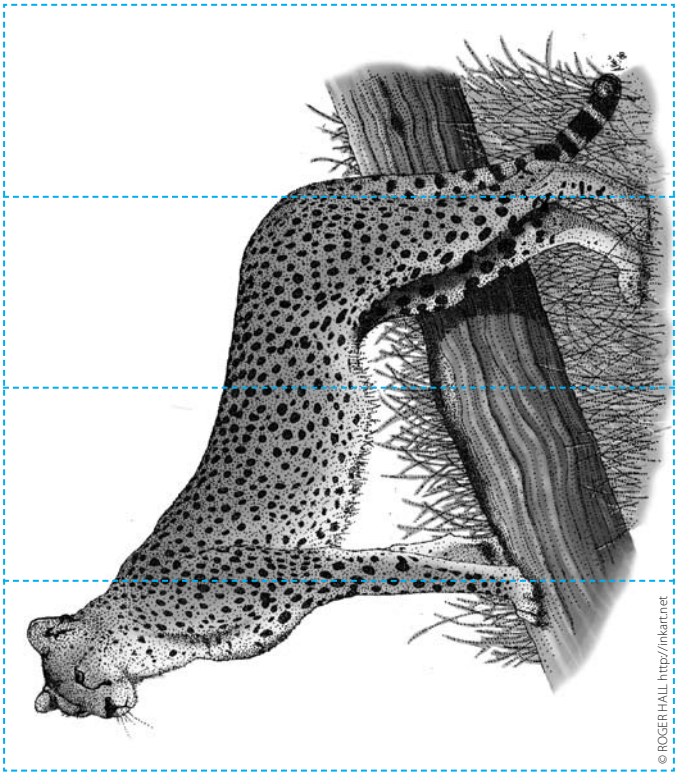
- http://animals.nationalgeographic.com/animals/mammals/snow-leopard.html—National Geographic has a snow leopard webpage. Here you will find basic information about the animal, an audio feature that allows you to hear a snow leopard, and a link to a photo gallery of big cats including cheetahs, jaguars, and bobcats.
- www.thebigcats.com/snowleo/snowleo.htm—The Big Cats website contains a snow leopard photo gallery, as well as extensive photo collections of other big cat species.

Cat Characteristic Cards









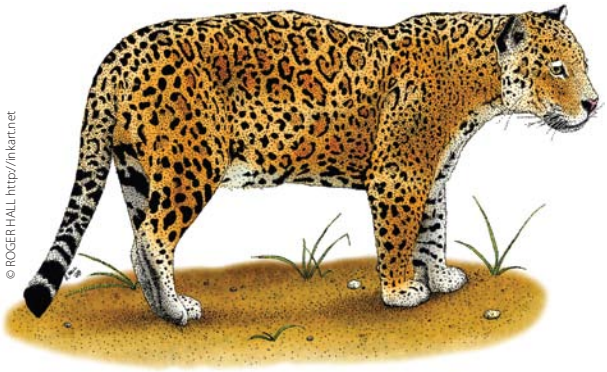
Big Cat Facts, page 1

Jaguar

Jaguars *(Panthera onca)* are the largest cats in North, Central, and South America and the third largest cat species in the world. The name jaguar means "able to kill with a single bound." Jaguars kill their prey with one crushing bite to an animal's skull. They have strong jaws and sharp teeth to do this. Their prey include deer, crocodiles, snakes, monkeys, turtles, frogs, and fish.

Jaguars usually hunt on the ground, stalking prey at night. They have mirror-like structures in their eyes that allow them to see better at night than they do during bright light. Their short, thick legs allow them to climb, crawl, and swim.

Jaguars live in many different habitats, including deciduous forests, rainforests, swamps, and grasslands. Most jaguars are found in lowland tropical rain forests. Unlike many cats, jaguars



enjoy being in water. They are able to swim and have been known to hunt for fish.

Jaguars look similar to leopards, but they are stockier and have shorter, thicker tails. They usually have yellow and tan coats, with black spots shaped like rosettes or small flowers that may provide camouflage. Some jaguars that live in rain forests appear almost black.

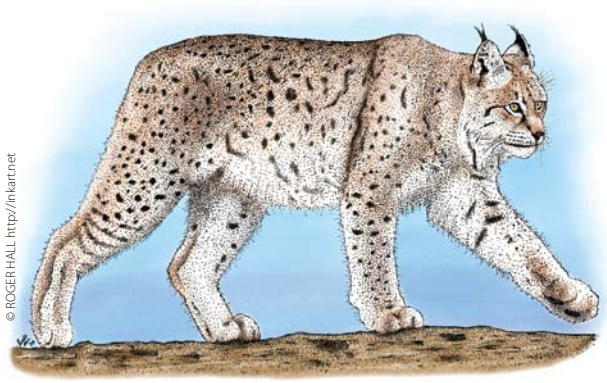
Canadian Lynx

Canadian lynx *(Lynx canadensis)* are fairly small wildcats, about twice the size of an average housecat. They are recognizable by their long black ear tufts, short black-tipped tails, and long legs.

They have grayish-brown fur. Their long, coarse hair keeps them warm in the snowy boreal forests where they live, in the northern United States and Canada. Large, furry paws act like snowshoes to help lynx walk in deep snow.

Lynx primarily reside in coniferous forests characterized by pines and firs. They use different types of forests for different purposes. Hunting is best in younger forests with dense vegetation. However, older forests are best for making dens.

Lynx primarily prey on snowshoe hares, though they also eat other small mammals and ground birds. Lynx are not particularly fast. They



wait in hiding for their prey or stalk it and then attack by surprise, pouncing on the prey. Most hunting occurs at night.

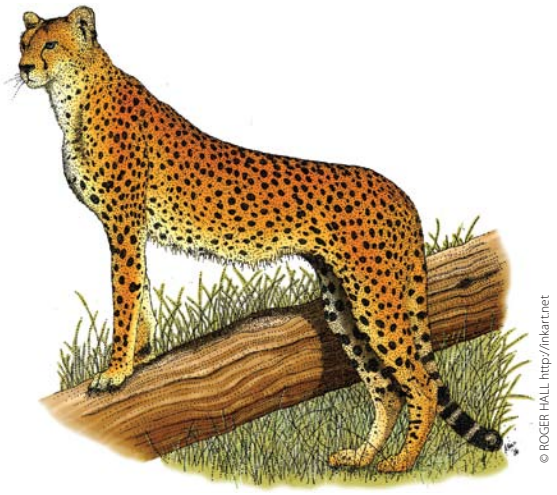
Big Cat Facts, page 2

Cheetah

Cheetahs *(Acinonyx jubatus)* typically live in grassy savannahs and plains in Africa and Asia. The word cheetah means "spotted one." Cheetahs have tan coats with small round black spots. They have distinctive black "tear tracks" that run from the inside corners of their eyes down to their mouths.

Cheetahs are the fastest land animal in the world. They can run up to 70 miles per hour, aided by narrow bodies and long legs. They are the only cats that cannot retract their claws, which help them maintain traction when they run (like cleats). Wide nostrils and large lung capacity also help them to run quickly. However, they can only run short distances before they become exhausted.

The cheetah has weak jaws and small teeth. It overtakes its prey by stalking the animal, then bursting into full speed until it trips the animal with its front paw, and finally biting the animal's



throat when it falls. Its diet consists of small antelopes, small mammals, and birds.

The cheetah eats quickly to prevent other predators from taking its food. Cheetahs also eat during the day when many competing predators are sleeping.

Snow Leopard

Snow leopards *(Uncia uncia)* are considered shy because they are rarely seen in the wild. They live high in the mountains of central Asia, where plants are scarce. Mountain air is "thin" because air pressure in higher altitudes is lower than at sea level. Snow leopards have strong lungs and large chest cavities to allow them to get enough oxygen from the air.

Thick, long fur helps them stay warm in snowy conditions. Their fur, which is typically yellowish-gray with black rosette-shaped spots, camouflages them in rocky and snowy conditions. The snow leopard's large furry paws act like snowshoes to help it walk on snow. Their large paws also allow them to grip rocks.

The snow leopard primarily preys on mountain sheep, goats, rodents, birds, and deer. Snow leopards hunt by hiding behind rocks on slopes

above prey animals, then leaping down and pouncing on the prey. Snow leopards can jump up to 30 feet, assisted by long, muscular hind limbs. They have extremely long tails (up to 1 meter, or 40 inches), which aid their balance. Their long tails are also useful for covering their faces to stay warm while they are resting.

Name Date

Graphic Organizer

Directions: Organize information from Big Cat Facts using this graphic organizer.

Jaguar

physical features:

environment:

adaptations (physical characteristics or behaviors that help jaguars survive)**:**

an interesting or unique fact about the jaguar:

Cheetah

physical features:

environment:

adaptations (physical characteristics or behaviors that help cheetahs survive)**:**

an interesting or unique fact about the cheetah:

Canadian Lynx

physical features:

environment:

adaptations (physical characteristics or behaviors that help lynx survive)**:**

an interesting or unique fact about the lynx:

Snow Leopard

physical features:

environment:

adaptations (physical characteristics or behaviors that help snow leopards survive)**:**

an interesting or unique fact about the snow leopard:

Graphic Organizer Answers

Jaguar

physical features:
yellow/tan coat with large black spots called rosettes - a central spot surrounded by a circle of spots; strong jaws; large sharp teeth

environment:
rain forest, deciduous forest, swamp, grasslands

adaptations (physical characteristics or behaviors that help jaguars survive)**:**
strong jaws and sharp teeth allow them to eat crocodiles and turtles; eyes adapted for nocturnal hunting; short, thick legs aid in climbing, crawling, and swimming; able to swim to catch fish

an interesting or unique fact about the jaguar:
can kill prey with one bite

Cheetah

physical features:
tan coat with black spots like dots; black tear tracks; long legs; narrow body; weak jaws; small teeth

environment:
savannahs, grassy plains

adaptations (physical characteristics or behaviors that help cheetahs survive)**:**
narrow bodies, long legs, unretracted claws, wide nostrils, and large lung capacity allow for fast sprinting; eat during the day to avoid competition

an interesting or unique fact about the cheetah:
fastest land animal in the world

Canadian Lynx

physical features:
twice the size of a housecat; grayish-brown fur; long black ear tufts; short black-tipped tails; long legs

environment:
boreal or coniferous forest

adaptations (physical characteristics or behaviors that help lynx survive)**:**
coarse, long hair to stay warm; furry paws help to walk on snow; because they are not fast, they can kill prey by ambush instead of running

an interesting or unique fact about the lynx:
they ambush their prey

Snow Leopard

physical features:
strong lungs; large chest cavity; long fur; large paws; long tail; yellow/gray coat with large spots; strong back legs

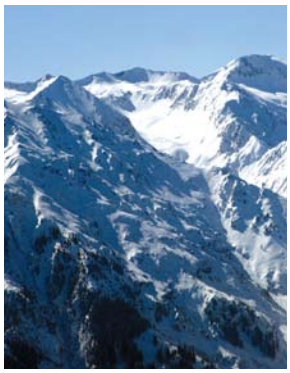
environment:
mountains at high altitude (alpine ecosystem)

adaptations (physical characteristics or behaviors that help snow leopards survive)**:**
strong lungs and large chest cavity to get oxygen at high altitude; thick, long, grayish fur for warmth and camouflage; large paws help to walk on snow and rocks; long tails aid balance and provide warmth

an interesting or unique fact about the snow leopard:
it can jump 30 feet

Four Ecosystems

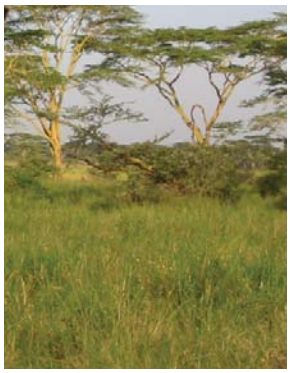
Alpine


BILL HOGUE

High in the mountains it is very dry and cold. Temperatures can fall well below freezing. There is less and less vegetation as altitude (height above sea level) increases. The landscape includes steep cliffs, rocks, and very little soil. Between the mountain slopes are meadows and deserts.

This is known as an alpine ecosystem. One example of this ecosystem is the Himalaya mountain range in Central Asia.

Savannah


KIM RAKOW BERNIER

Savannahs are grassy plains with a few scattered shrubs and trees. They are warm all year long. Savannahs have a wet season in the summer, followed by a long dry season in the winter. Not enough rain falls to support growth of a forest. Most of the vegetation in savannahs is tall grass.

Savannahs are often called grasslands. One example of this ecosystem is the Serengeti plains in Eastern Africa.

Tropical Rainforest


JESSICA MCDOUGALL

Lowland tropical rainforests are located near the equator. These rain forests are warm all year long and receive lots of rainfall. There are many species of trees and plants in the rain forest; in fact, this ecosystem supports more species of plants than any other. There are also many different kinds of animals in a tropical rain forest. Trees in the rain forest grow very tall, in some cases over 100 feet high.

One example of this ecosystem is the Amazon rain forest in South America.

Coniferous Forest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Coniferous forests are found in northern latitudes, such as those that occur in Canada and Russia. They are characterized by conifers, trees like pines and spruces that typically stay green all year long. These forests have long, cold, dry winters and short summers.

Some coniferous forests are found in the northern boreal forest biome. Forests in Alaska and Canada are an example.